Community Oriented Wolf Strategy

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Year 2 Progress Report
September 2004 - September 2005

by

Oldman Basin Carnivore Advisory Group

with compilation by:

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We, the non-governmental members of the Oldman Basin Carnivore Advisory Group, have reviewed the Community Oriented Wolf Strategy Year 2 progress report, and have found that it is a satisfactory representation of information we have considered as necessary context in our decision-making and recommendations, and of recent progress in wolf management in Southwest Alberta (undersigned):

ORIGINAL SIGNED BY ALL MEMBERS

_____

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Charles Mamo (Southern Alberta Conservation Cooperative)

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Cover photo: A remote camera, part of study led by Dr. Michael Quinn with the Miistakis Institute (University of Calgary), captures a wolf travelling along a wildlife path west of the Livingstone Range in Southwest Alberta (summer 2005).

Executive Summary

Since the recent, natural re-establishment of a wolf population in southwest Alberta, wolf management has been characterized by reaction to livestock-wolf conflicts through non-specific removal of wolves in localized problem areas. This problematic approach failed to provide adequate information about the status of the wolf population, or to understand and explore the dynamics and solutions to livestock depredation issues. In 2003, a new approach was initiated, characterized in its first year by:

- Large gains in biological information: pack size, reproduction, survival, denning
- Identification of uncollared packs
- Minimum, defendable population estimate of wolves in SW Alberta
- Timely information on wolf activity provided to ranchers for proactive response to wolf conflicts
- Improved characterization of livestock depredation incidents
- Ability to target specific packs or individual wolves effectively and in a timely and humane fashion, when lethal control is deemed necessary
- Ability to deploy backup collars when needed, to maintain our tracking ability of wolf packs, and ability of problem wildlife staff to effectively address depredation
- Establishment of solid knowledge as basis for effective communication (to Advisory Group, ranchers, public, funders, etc.)
- Communication and collaboration among a wide range of interests in the region

All of these new management components have continued through 2004 and 2005. In addition, a new wolf management goal has been established: to maintain stable, contiguous packs throughout the area. This contrasts with the previous management goal that was framed solely by a number that had little biological or social context. This re-framing of the management goal was possible only because of large gains in understanding of wolf demography and movements, and of impacts of lethal control of wolves in SW Alberta. Moreover, the support of the multi-stakeholder Oldman Basin Carnivore Advisory Group was key to the development and delivery of all these efforts. This group met seven times throughout the second year to examine new information and discuss the direction and objectives of wolf management for the area, providing Fish and Wildlife managers with advice and recommendations on wolf management and depredation issues.

Three wolf packs monitored in the previous year continued to be tracked using Argos satellite technology. Knowledge gained from tracking allows for adequate determination of population size (wolf inventory), and assists in managing for a sustainable level of mortality. In addition, the tracking of wolf movements allows for determination of territory boundaries. Pack territory boundaries remained similar to the previous year, despite significant management/landowner removals in two of the three monitored packs.

In total, seven wolves were captured and released in the second year, and with previous collaring efforts, a total of 11 individual wolves in four packs (including one wolf that dispersed to a new pack in Montana) were monitored for movements and/or survival. Wolf population size in 2004-2005 was conservatively estimated at 53 (high) and 27 (low, after all mortality accounted for). This was similar to numbers estimated the

previous year (61 – high; 25 – low). Annual survival rate of wolves in southwest Alberta was determined to be 45% (44% in 2003-2004). This survival rate is considered to be on the threshold for long term sustainability for the wolf population. Calculations of home range size showed that 90% of a home range can be determined with approximately two months of Argos data (1-3 locations/day/wolf).

From a wolf habitat perspective, examination of a model produced for grizzly bears demonstrated that it is an excellent descriptor for habitat use by wolves in SW Alberta. An overlay of the boundaries identified as focal areas for wolves (two different packs) on the grizzly bear habitat model showed that wolves highly preferred areas of the highest habitat suitability for grizzly bears. This habitat map should provide a useful tool for determining the impacts of human activities on wolf habitat and populations, and should be used as the primary tool for the area when assessing wolf habitat.

Annual livestock depredation rates by wolves were reduced in the Willow Creek pack territory, following significant lethal control actions in the previous year. This pack was responsible for 4 confirmed livestock attacks and 2 unconfirmed incidents in 2004-2005 (in comparison to 28 killed or injured in 2003-2004; OBCAG 2004). No wolves were killed from the Willow Creek pack in 2004-2005.

In contrast, nineteen livestock kills or injuries were confirmed in the Bob Creek pack territory (a similar number of 15 livestock attacks occurred in 2003-2004). Incremental lethal control actions were employed in the Bob Creek territory, with the removal of one adult female wolf. In addition, landowners shot three other wolves in this pack. In the Castle-Carbondale wolf territory, five reports of livestock attacks by wolves were reported (none in the previous year). Landowners and hunters killed five wolves in this pack.

Upon the suggestion of the CAG, an interim threshold for lethal control was set at three incidents of depredation in three months, to be reviewed as more information is collected. It is especially important to point out that the goal of lethal control in SW Alberta is to reduce conflicts with people *while at the same time allowing for some measure of stability* in the wolf population (i.e. stable, occupied pack territories through time) through carefully measured actions. This contrasts with lethal control conducted in some other areas of Alberta where the intent of lethal control is *to reduce* wolf populations for various other reasons (e.g. to allow increasing ungulate populations, or to protect endangered species).

As we continue to learn more about these issues, it is hoped that new, non-lethal methods may be developed to reduce or eliminate livestock depredation issues. This year, we conducted a non-lethal experiment to test the effectiveness of "night riding" as a deterrent to depredation. While this experiment proved 100% successful in preventing depredation (with a control period as well in which depredation occurred in the absence of night riding), the cost was considered prohibitive by the ranching community.

In summary, excellent progress continues to be made in wolf management in SW Alberta, with full support and encouragement from the many stakeholders comprising the Oldman Basin Carnivore Advisory Group. Should funding levels and interest from the community continue, we expect to continue these efforts in subsequent years.

Report Goals:

1) To provide an update on activities of the Oldman Basin Carnivore Advisory Group in 2004-2005

2) To provide a biological update on the wolf population inhabiting the Pincher Creek Wildlife Management Area

3) To provide an update on wolf management activities related to the issue of livestock depredation

4) Maintain a knowledge base for public communication and funding requests related to wolf management in the Pincher Creek Wildlife Management Area

I. Introduction

This report is the second in a continuation of a series of annual reports initiated in September 2004 to document activities and information related to wolf management in southwest Alberta, specifically to the Pincher Creek Wildlife Management Area. A full historical introduction to the topic (including the re-establishment of wolves in southwest Alberta, management response to this establishment, as well as biological and livestock depredation information and study area description) is provided in the report produced for the first year (2003-2004; Oldman Basin Carnivore Advisory Group [CAG] 2004).

The management area under discussion incorporates wildlife management units 300, 302, 303, 304, 305, 306, 308, 310 (partial), 400 and 402. This area is roughly defined by the international border on the south, BC border on the west, Highway 2 on the east, and the Highwood River-Pekisko drainages to the north.

II. Progress in wolf management: September 2004 to September 2005

A. Management strategy development

As an interim, general guiding strategy for wolf management in SW Alberta, the following components and guidelines were derived from a re-draft of the "Oldman Wolf Strategy" (Quinlan 1998), incorporating recent advances in knowledge, budget, management techniques, and recommendations from a local advisory group.

i. Management Goal

The provincial wolf management plan (Alberta Fish and Wildlife Division 1991) suggests a goal of 50 wolves for the Oldman River drainage. Recent data from a single year (Oldman Basin Carnivore Advisory Group 2004) suggest that the annual population estimate may vary from 20 to 60 wolves; it is crucial to understand how much annual variation is associated with this estimate. Moreover, these data suggest that the majority of acceptable wolf habitat in the area is occupied by stable packs (i.e. related individuals occupying a home range that encompasses similar foci of pack activity through time, across years), and that opportunities for the establishment of new packs in the area are slim due to space limitations (lack of additional unoccupied habitat). Ongoing cattle depredation in the area currently necessitates lethal control in some instances. It is therefore a more reasonable management goal to strive for the maintenance of stable, contiguous packs (continuous wolf distribution), rather than to be guided solely by a population goal, as is common for many ungulate populations. Thus, our interim management goal for wolves in Southwest Alberta incorporates these additional ideas.

ii. Wolf Inventory

Wolf inventory is necessary to understand current population levels, sizes of individual packs, home ranges of packs, and wolf distribution on the landscape. The most viable method of conducting such inventory is to follow satellite collared individuals through time from each known pack. This approach has been used effectively in other jurisdictions such as Banff, Yellowstone and the Northern Continental Divide Ecosystem. To develop an ongoing monitoring program, two to four wolves need to be collared in each pack at all times, with at least one of these collars providing satellite technology, and the remainder being VHF collars (or GPS collars for additional research opportunities) to provide backups should the primary collar be lost, and to monitor demographic characteristics of the population.

A newly developed inventory technique, forward-looking infrared, that uses heat sensitive video photography to locate animals in dense cover, may have some application for wolf inventory. This has not yet been explored.

iii. Limitation of Wolf Mortality

The current management regulations for wolves in SW Alberta require a review for possible amendments. Livestock are present throughout most of the area, hunter numbers are high, and wolves are more susceptible to harvest than in more northerly locations. Presently, hunters do not require a licence to shoot wolves, there is no bag limit, and the season is nine months long. A system requiring licencing of hunters and the establishment of a quota has been under consideration for several years, but has not been implemented. This situation requires review by the Oldman Basin Carnivore Advisory Group, and adoption by the Senior Wildlife Biologist in a manner that is acceptable to the committee.

iv. Response to Wolf Depredation of Livestock

Response action by Fish and Wildlife officers is required when repeated livestock depredations occur. This action historically involved the use of approved toxicants

applied using techniques to minimize poisoning of non-target species. This has proven highly unfavourable with the general public. Mechanical trapping has also been used, but has not proven as successful and also has impacts on non-target species. The necessary delay until winter when using these techniques, combined with the wide-ranging and potentially overlapping territories of wolf packs has raised concerns that control work may not always target the individual wolves responsible for the depredation, and thus has unacceptable consequences for the broader management of the population.

Activities identified in the wolf inventory component of this strategy allow for more efficient and selective capture and removal of offending wolves, and increased certainty that the correct wolves are being targeted. When individual wolves are identified as a problem, they are removed more quickly, effectively and humanely compared with mechanical trapping or use of toxicants. Decisions regarding problem wolf response work will continue to be made by the Area Problem Wildlife Specialist, and the Senior Wildlife Biologist, in consultation with District Officer staff. The development of a document outlining thresholds and actions for this form of lethal control is currently being developed. The CAG has recommended a threshold of three depredation incidents (an incident being defined as a wolf attack on one or more livestock on a single day) in three months, for the initiation of lethal control actions. It is recognized by the CAG that the nature of incremental control (i.e. the number and status of wolves removed from the pack) may vary, depending on the circumstances (size of the pack, history of livestock depredation, time of year, location of cattle on private vs. public land, etc.).

v. Oldman Basin Carnivore Advisory Group (CAG)

Albertans hold varied opinions on how wolves should be managed. Many people on all sides of wolf issues are extremely committed to their causes and beliefs. Experience gained during the 1994-1995 period of high public interest in wolf management strongly indicates that we must involve many sectors of the public in determining local wolf management strategies, if we are to be successful in our wolf management objectives. The reasons for lethal control need to be explained more effectively to the public so that this work can proceed unimpeded when necessary. We learned in 1994-1995 that large public meetings are not an effective way to gauge public opinion regarding wolf management.

The Oldman Basin Carnivore Advisory Group, established in 2003, provides input to Fish and Wildlife staff on matters related to local wolf management. This committee acts in an advisory capacity to the Senior Wildlife Biologist and the Area Problem Wildlife Specialist, and comprises representatives from several organizations:

Alberta Beef Producers
Federation of Alberta Naturalists
Defenders of Wildlife Canada
Municipalities, represented by MD Ranchlands
Alberta Trappers Association
Local ranching interests

Agency representation includes the Senior Wildlife Biologist (SRD), the Area Problem Wildlife Specialist (SRD), an SRD range manager, and a representative of Community Development (Provincial Parks).

vi. Staff and Capital Resource Requirements

A wolf specialist needs to be designated within the Pincher Creek Wildlife Management Area. This person would work year-round to trap, collar and monitor wolves for inventory, management and problem wildlife purposes, and to assist other staff in management and response activities related to wolves. Currently, this role is being filled by existing staff and part-time staff provided through collaboration with NGO's such as DWC. However, the time demands are great on these staff, and are causing detriment to other areas of wildlife management in the area. This cannot continue indefinitely.

An estimated annual budget is as follows:

Salary (technician)	40 000
Vehicle: 4WD truck	8 000
Quad/Snow machine	5 000
Trapping supplies	15 000
Wolf Inventory	10 000
Monitoring/capture flights	20 000
Total	98 000

SRD has provided an annual budget of $30 000 - $40 000 for the last three years, and significant matching contributions have been provided by several other organizations. These actual contributions are detailed in Appendix 1.

B. Oldman Basin Carnivore Advisory Group meetings

The following table provides a schedule of meetings held by the Oldman Basin Carnivore Advisory Group.

Table 1. Oldman Basin Carnivore Advisory Group meeting summary, September 2004 – September 2005.

Date	Meeting Place	# attending/total members
9 September 2004	Chain Lakes	10/12
2 December 2004	Chain Lakes	10/12
27 January 2005	Chain Lakes	9/12
28 February 2005	Chain Lakes	9/12
8 March 2005	Chain Lakes	10/12
16 March 2005	Chain Lakes	10/12
29 April 2005	Chain Lakes	10/12

C. Non-lethal control and prevention of depredation

i. Magnitude of livestock and wild prey occurrence in wolf territories

It is desirable to understand the extent to which wolves may incorporate different food sources into their diet. A basic keystone to this understanding is the availability of different food sources within each wolf territory, or across the landscape. Table 1A, although incomplete, provides a suggestion for future data collection or synthesis of data that may be available from other government Divisions (e.g. Rangeland Management).

Table 1A. Summary of main prey availability for collared wolf packs in Southwest Alberta (incomplete).

Wolf Territory	# allotments in wolf territory	Area of allotments	Total number of AUM's in wolf territory (growing season – allotments only)	Total number of cattle in wolf territory (dormant season – private and public land)	Estimated elk number in wolf territory (winter)	Estimated elk number in wolf territory (summer)	Estimated deer number in wolf territory (winter)
BC	17		17566	1972			
WC	4		1993	1624			
CC	4		1670	??			

ii. Nightriding

In spring 2005, the SRD Rangeland Management Branch, with the participation of Bob Creek Ranch, continued an experiment to document seasonal habitat selection of cattle. The SRD Fish and Wildlife Division expressed concerns about risk of wolf depredation in this area of public land during the spring months, based on 4 wolf kills and one injury of cattle in the preceding month in other portions of the Bob Creek wolf territory. A compromise was made, and a "nightrider" experiment designed in the previous year was carried out. The full report documenting this experiment and its results appears in Appendix 2. The objectives in this experimental approach were:

- To test whether human presence combined with the ability to detect wolf presence through radio telemetry is effective in deterring or decreasing depredation rates of cattle, during hours of darkness (can a "nightrider" be effective?).

- To examine the economics of "nightriding" as one of a suite of proactive measures intended to minimize wolf-cattle conflict.

iii. Summary of DWC activities (J. Pissot to provide)

iv. Rancher efforts (R. Davis to provide)

III. Biological update

A. Willow Creek Pack

Biological information

Table 2. Management actions and mortality affecting the Willow Creek wolf pack.

Date	Management Action
September 2004	Three wolves determined present in territory defined in previous year
3 November 2004	VHF collar replaced on adult female WC3 (#79)
15 December 2004	Monitoring flight (collared wolf WC3 located)
15 January 2005	Argos deployed on one uncollared wolf [WC5]; third wolf in pack observed wearing unknown collar
28 April	Monitoring flight; WC3 female located near suspected den site
Early May 2005	Last transmission from satellite collar on WC5 female (collar failure assumed); only 1 known functioning collar remains in pack
24 May 2005	Monitoring flight; located WC3 female near suspected den site
16 June 2005	Located WC3 female near suspected den site
August 2005	C. Mamo sighted 2 pups (5 total in pack)

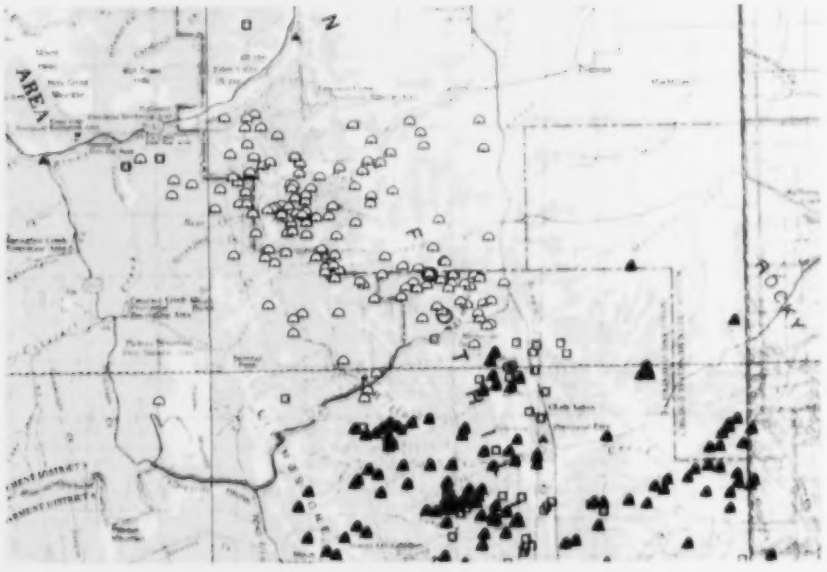

Figure 1. Movements of adult female WC5 (yellow circles), from 15 January 2005 to 1 May 2005.

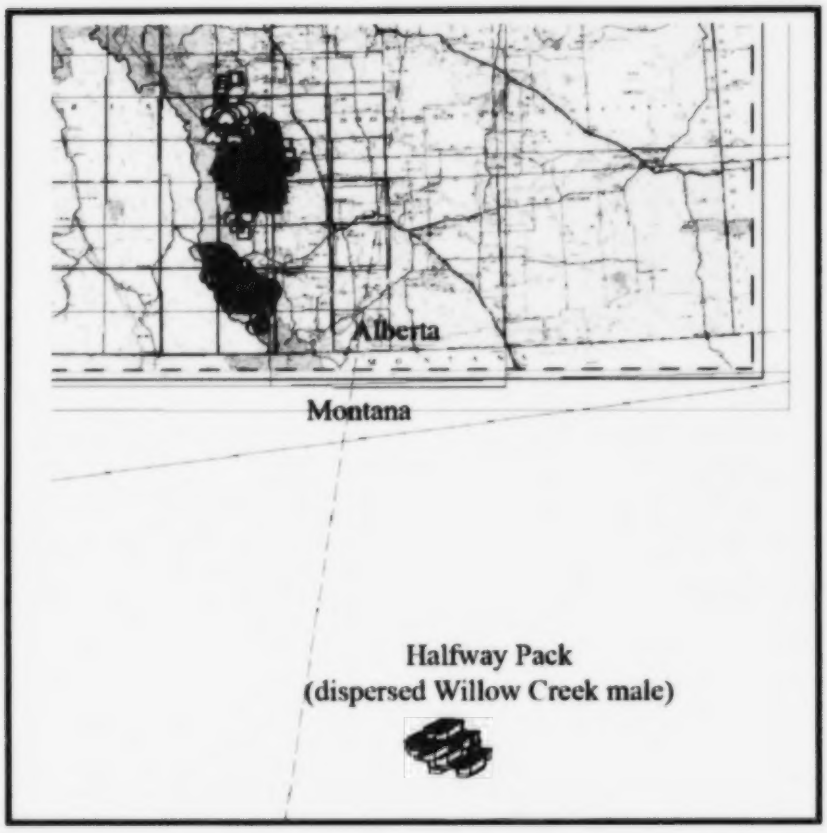

Figure 1A. Movements of dispersed yearling male WC2 (clumped locations in lower right of frame, near Helena, MT in new territory [Halfway Pack]), from 1 September 2004 – 9 December 2004.

Depredation information

Table 3. Summary of depredations in the Willow Creek area, September 2004 to September 2005. "Retro=Y" refers to the retroactive determination that the Willow Creek pack was responsible for the depredation, once the territory and movement patterns had been identified.

Date	# livestock confirmed killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence Number	Details
12 April 2005	1 calf			1	05-1414	Saw one collared wolf running out of pasture when they found the calf; satellite confirms WC wolves in area
30 June	1 cow			2	05-9500	R. Gluckie investigated; found

Date	# livestock confirmed killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence Number	Details
2005						at 9pm; cow about 4 years old; manager took a shot at collared wolf leaving kill site – wolf yelped, but he figures he missed it. Bears and coyotes had also been feeding on carcass. 100% consumed
18 July 2005	1 heifer			3	05-11121	Wolves had fed on heifer, but carcass later taken over by grizzly bear; 450 yearlings moved into pasture on 29 June
24 July 2005			1 yearling	4	05-11489	Lacerations on udder and right groin/shoulder; treated with antibiotics
Early August				5	??	Cows chased through fence; not reported until an animal injured in late August
31 August			1 yearling	5	??	Not confirmed; producer didn't think he'd be able to find the animal for inspection

B. Bob Creek Pack

Biological information

Table 4. Management actions affecting the Bob Creek wolf pack, implemented by F&W with multi-stakeholder support, September 2004 to September 2005.

Date	Management Action
15 December 2004	Monitoring flight (2 of 3 collared wolves located)
2 January 2005	BC3 shot by rancher while among horses (alone; rancher did not observe collar that had yellow tape on it)
15 January 2005	BC1 and BC2 recaptured and 2 malfunctioning Argos collars recovered; 1 VHF, 1 Argos deployed; third black female captured and released with VHF collar (BC5)
20 March 2005	On March 20 a rancher saw wolf with yellow collar and opted not to shoot it, as he understood the management role of the collared wolf.
30 March 2005	BC2 euthanized – not pregnant, excellent condition, empty stomach; BC6 adult male caught and fitted with Argos collar
28 April 2005	Monitoring flight confirms 5 wolves remain in pack (4 dark,

Date	Management Action
	1 light)
May 2005	Satellite data suggest denning occurring in north end of territory
4 May 2005	Gray uncollared male wolf shot by rancher while amongst cattle
15 May 2005	Male wolf shot by rancher while amongst cattle; pack now reduced to 3 adults
24 May 2005	Monitoring flight; all three collared wolves located
September 2005	All three collared wolves still transmitting

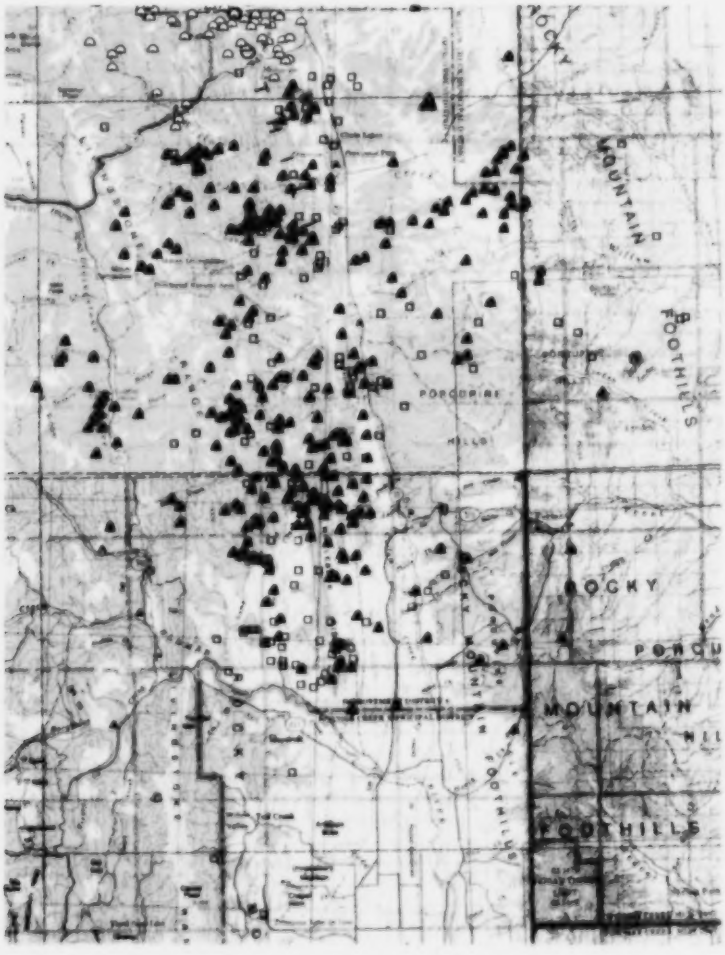

Figure 2. Movements of adult female BC2 (hollow squares; 16Jan05-30Mar05) and male adult BC6 (red triangle; 31 Mar 05 – 30 Sept 05) in Bob Creek wolf pack.

Depredation information

Table 5. Summary of depredations in the Bob Creek area, September 2004 to September 2005.

Date	# livestock killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence number	Details
September 2004		1 calf		1	04-21643	Not reported for 2 months (November 7) private grazing lease
31 December 2004	1 calf			2	04-26592	private land; 2 sets of wolf tracks; 1 other calf through fence; dead calf weighed 400 lbs; lacerations at shoulder, anus, nose and tail bitten off; some feeding;
1 January 2005		1 pregnant cow	2 pregnant cows	3	04-26466	Cow that was put down had anus/vulva very ripped up; one other had lacerations but no obvious puncture wounds; third had lacerations and punctures, but anal area intact; Herd to start calving in one week; cattle restless for a couple weeks and checks were increased by the manager; hoped to keep cows out longer by a couple weeks, but has taken them off; do we have money for rendering truck – no, animal was shot and left for animals?; 84 in herd and all to belong to one producer
1 January 2005	1 2-yr old heifer			3	04-26466	Not discovered until 1 Feb; cattle restless last couple weeks so had been checking cattle more often;
24 January 2005	1 cow			4	04-26466	Lacerations on tail head and right flank; bruising, ear torn; how much is fed on? Is this remains from previous attack as I thought the

Date	# livestock killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence number	Details
						cattle were already moved out after last incident?? Notes have been added on to original occurrence.
31 January 2005		1 2-yr old heifer	1 cow (bite on rear end from same time) and 1 bred heifer (torn ear about same time as depredation) with minor injuries	5	04-28511	Wolves scavenging on another cow that died of other causes; this cow dead at least a couple days and fed on by coyotes and then by wolves on night of 31 January. Did not know she was dead. How far from the house was the kill (1 km SW), and the dead (1.5 km SW)? Why does it take so long for the rendering truck – what is the cost?; three collared wolves picked up nearby; satellite locations 1.5km south of buildings on morning of 31 Jan; a third cow was bitten on ears… get info still
12 February 2005	1 cow			6	04-29659	J. Clarke has details; none eaten by wolves, as animal died after it was found; anus ripped open; although out of normal Bob Creek territory, collared female BC2 was present at site; 2 sets of wolf tracks were evident; carcass was moved up the valley, away from the cattle; complainant didn't think wolves needed to be killed; 225 cattle in herd
14 March 2005	1 pregnant cow			7	04-31552	Lacerations around head of tail and rear right leg; extensive feeding by wolves on carcass; Rancher is okay with the one loss, but not more; not

Date	# livestock killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence number	Details
						investigated until 17 March as rancher didn't think about predators; cows had been pushed through the pasture; 200+ cattle that had wintered in the Waldron area; calving not until mid-April; Terry to check number of cattle; consumed over the few days before inspection; remains left in field
21 March 2005	2 yearling (1 steer, 1 heifer)	1 steer yearling		8	04-31587	1 reported dead and 1 injured (bite marks everywhere, ears torn off, anal area ripped open) on 22nd March; 1 totally consumed with coyotes involved; a second dead steer discovered in creek with flesh above water consumed; Terry did not want to suggest the dead truck; producer upset about the losses; wanted us to kill wolves
22 April 2005	1 cow (w/calf)			9	05-3248	Had her calf 21April, and was killed night of 21-22; no feeding on cow; plain view of Hwy; not happy with compensation; have a dead pile on land
2, 7 May 2005	3 steers			10	05-4604 05-5231	All meat of first animal consumed, believed killed the night before; found at base of steep south-facing slope; appeared a bear may also have fed on kill; second steer discovered in investigation, also consumed and described as "small;" 2nd steer located 1 km from first on top of high ridge in open area ; about 1200 yearlings of assorted sizes in pasture; 3rd steer found

Date	# livestock killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence number	Details
						several days later with only hide left – submitted as probable wolf kill, completely consumed.
24 July 2005			1 cow	11		Lacerations on udder, right shoulder and groin
3 August 2005		1 calf		12	05-12608	injury on calf (4 mon. heifer) is about one week old, all hide gone from tail, festering and maggots, teeth marks apparent; also, a bull is missing testicles, but healed – unable to confirm as wolf depredation

C. Castle-Carbondale Pack

Biological information

Table 6. Management actions affecting the Castle-Carbondale wolf pack, September 2004 to September 2005.

Date	Management Action
15 December 2004	Monitoring flight (2 of 3 collared wolves located; first Argos collar may be dead)
1 January 2005	Male wolf shot by hunter near Fish Lake
15 January 2005	Large male (CC4) captured and VHF deployed; 10 wolves in pack
10 February 2005	Argos collar deployed in July 2004 on female CC3 fails (possible human-caused mortality – later found collar in creek, disassembled)
16, 21 March 2005	2 juvenile wolves killed by ranchers (1 uncollared male and 1 uncollared female)
30 March 2005	Attempt capture; no signals found
9 April 2005	Monitoring flight; CC2 found in home territory
26 April 2005	Attempt capture; no signals found
28 April 2005	Monitoring flight; no signals found
24 May 2005	Four wolves spotted hunting turkies by landowner west of

Date	Management Action
	Beaver Mines
24 May 2005	Monitoring flight; no signals found
June 2005	CC2 located north of Waterton Park outside of known territory;
July 2005	Argos collar from CC3 female recovered in creek; unknown human-caused mortality
September 2005	CC2 located north of Waterton Park
21 September 2005	Female wolf shot by hunter in Carbondale area

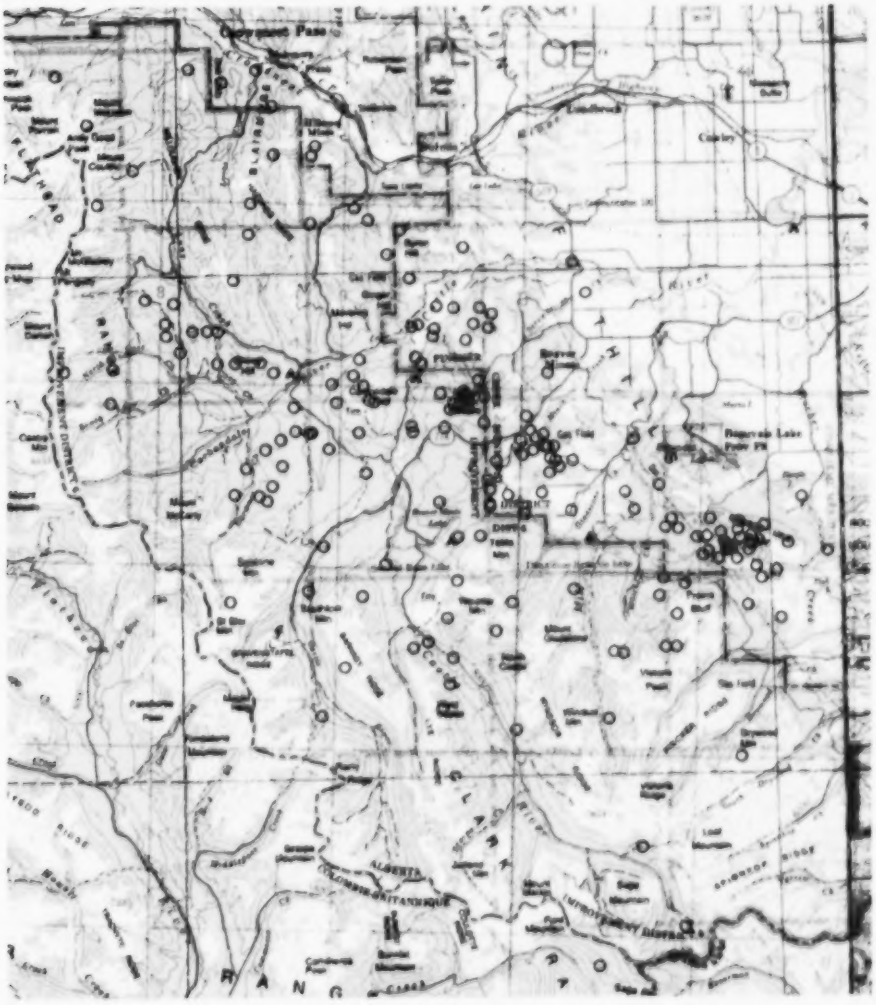

Figure 3. Movements of female yearling wolf CC3 (hollow circles), from 3 September 2004 to 9 February 2005.

Depredation information

Table 7. Summary of depredations in the Castle-Carbondale area, September 2004 to September 2005.

Date	# livestock killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence number	Details
19 February 2005	1 cow (2-year old bred heifer) and her calf			1		Unconfirmed, reported to C. Bergman by the producer; "not worth his while to make a claim;" cattle just beginning calving; cow's rear end consumed, calf consumed – calf may have been fetus, not sure; carcasses burned
22 February 2005	1 calf			2	04-29953	Halfway through calving of ~ 50 cows; was out at 3am night of depredation firing flares to scare off wolves; calf weighed about 70 pounds
22 February 2005	1 calf			3		Unconfirmed; calf not seen alive, but hoof covers gone; 2 wolves shot in week of 13 March
18 September 2005	1 bull			4	05-16544	Near Shell Plant
30 September 2005		1 yearling		5	05-19218	Yearling in poor condition, only 450 lbs, had lost a lot of weight; in Castle grazing allotment with many other cattle; damage to thigh, groin, front quarters.

D. Other wolf sightings/depredations outside of defined/known territories

Biological information

Table 8. Mortalities in uncollared wolf packs, September 2004 to September 2005.

Date	Management Action
20 September 2004	Female wolf shot near Daisy Creek
February 2005	Two male wolves trapped in WMU 404

Table 9. Summary of depredations outside known territories, September 2004 to September 2005 (possible pack identities are suggested in brackets, in Details column).

Date	# livestock killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence number	Details
12 February 2005	1 pregnant cow			1	04-29659	225 pregnant cows and bulls – red angus; near calving; doesn't know exact number; carcass left in field but later dragged over ridge; some feeding going on of hay; Bob Creek female was present at the depredation site (possible Crowsnest pack?)
1 June 2005			1 yearling heifer	2	05-6657	3 wolves attacking yearlings observed and reported by neighbour of producer; (possible Chief Mountain pack?)
29 July 2005		1 cow		3	05-12945	Cow was found near Fly Creek, but attack likely happened nearer to Racehorse Flats, where cows were living; cows appeared to b e

Date	# livestock killed by wolves	# livestock injured by wolves and put down	# livestock injured by wolves, and recovered	Producer receiving losses	Occurrence number	Details
						pushed to Fly Creek by wolf activity near Racehorse Flats; animal taken to vet, and recommended to be put down; deep lacerations around anus/vagina; (possible Crowsnest pack?)
1 September 2005		1 yearling		4	05-14799	Very few details provided by investigating officer; (possible Chief Mountain pack?)
7 September 2005		1 yearling		5	05-15479	Grizzly female and 2 cubs feeding on carcass (killed by bear?); scratches on rear end and tail bitten off; (possible Chief Mountain pack?)

E. Home range estimation

An examination of the relationship between home range size and the number of wolf locations contained within the home range yields a saturating curve (one that levels out) that predicts 90% of the home range size is defined with about 100 locations. At current satellite fix rates, this quantity of data is acquired in approximately two months (0-3 locations per day).

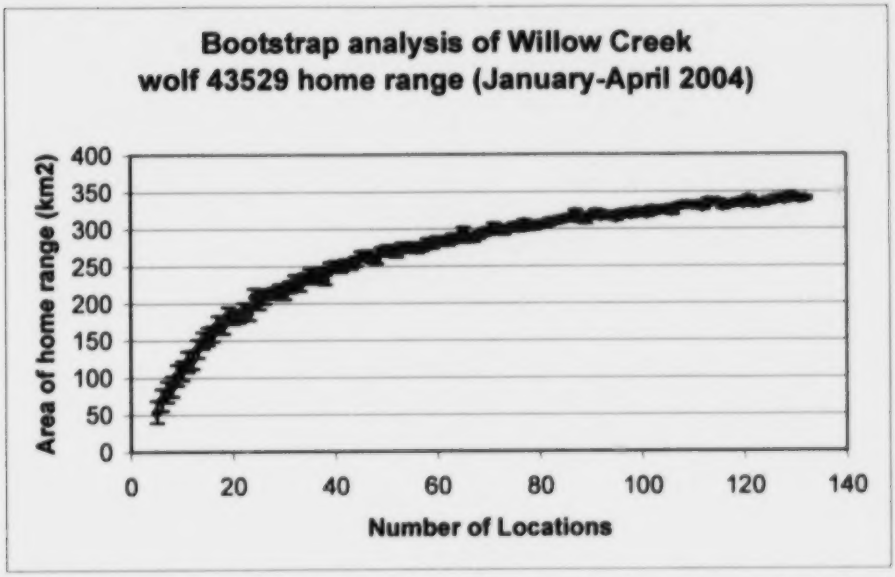

Figure 4. Calculation of the number of locations required to adequately define home range size.

F. Population estimation

Using knowledge from a variety of sources (observations of F&W staff, contract biologists, reputable landowners, registered trappers, and hunters who harvested wolves), a population estimate of wolves for southwest Alberta was derived (Table 10). A conservative maximum estimate of 53 wolves (61 in previous year) includes packs when they were at their largest (with pups of the year). The minimum of 27 (25 in previous year) represents the sum of packs at their smallest after known annual mortality was taken into account; or, when no mortality had been reported, the minimum number observed in the area (and therefore is likely conservative).

This population estimate includes wolves of all ages, including pups of the year. It does not include the Tent Mountain pack, a trans-boundary pack with BC, believed to spend a portion of its time in Alberta. Legal registrations show that five wolves were removed from the Tent Mountain area in the winter of 2002-2003. The current status of the pack inhabiting the area is unknown.

Table 10. Information used in estimating population size of wolves in southwest Alberta study area, 2004-2005.

Pack location	# wolves in pack (peak)	# wolves in pack (low)	Information source
Willow Creek	5	3	Direct observation
Bob Creek	8	3	Observation of capture team
Castle-Carbondale	12	4	Observation of capture team; landowner observation in May
Waterton/Pole Haven	13	4	Observation of rancher/SRD

Pack location	# wolves in pack (peak)	# wolves in pack (low)	Information source
(Chief Mountain pack?)			staff
South Livingstone (Crowsnest pack?)	5	5	Grad student work by Conrad Thiessen (U of Alberta); winter estimate
North Livingstone (Beehive pack?)	10	8	Grad student work by Conrad Thiessen (U of Alberta) ; winter estimate
POPULATION RANGE 2003-2004	**53 (high)**	**27 (low)**	

G. Survival rate estimation

"Survival rate" is the proportion (between 0 and 1) of a population that survive a pre-defined time interval, be it a year, month or day. "Mortality rate" is the proportion that die (or disperse out of the population) in a time interval, and is calculated as "1 – survival rate." Using the methods of Trent and Rongstad (Krebs 1989, p. 434) that incorporate the number of radio tracking days (n=10 wolves; 2308 radio-wolf-days to end of September 2005; Table 11), and dates and numbers of known deaths or dispersal of marked animals (five), a **daily finite survival rate of 0.9978** was estimated for the SW Alberta wolf population. If adjusted to an annual survival rate, the survival rate estimated from collared wolves is 45%. We have chosen to include the fate of two wolves recorded as "unknown" (possible collar failure) as "dead," since there was not full compliance with the requirement for hunters to register all wolves killed in the area. However, if these two wolves were simply lost track of due to collar failure, the actual survival may be higher.

Table 11. Radio monitoring days for marked wolves in the Pincher Creek Management Area. Wolf ID is across the top, and radio days below.

	WC3	BC1	BC2	BC3	BC5	BC6	CC1	CC2	CC3	CC4
Sep	30	30	30	30			30	30	30	
Oct	31	31	31	31			31	31	31	
Nov	30	30	30	30			30	30	30	
Dec	31	31	31	31			15	31	31	
Jan	31	31	31	2	17			31	31	17
Feb	28	28	28		28			28	10	28
Mar	31	31	30		31	2		31		30
Apr	30	30			30	30		30		
May	31	31			31	31		31		
Jun	30	30			30	30		30		
Jul	31	31			31	31		31		
Aug	31	31			31	31		31		
Sep	30	30			30	30		30		

	WC3	BC1	BC2	BC3	BC5	BC6	CC1	CC2	CC3	CC4
TOTAL DAYS MONITORED (2308)	395	395	211	124	259	185	106	395	163	75

Research indicates that mortality rates greater than 30-40% of early winter population (not daily mortality, as calculated above) can lead to a declining population (Carbyn *et al.* 1995). Assuming that "early winter" begins 1 November in the conversion of the SW Alberta daily survival rate to a survival rate between November and April (182 days), an estimate of 0.675 is produced, i.e. the proportion of wolves surviving from November to April is 68%. The mortality rate for the same period is thus 0.325 (33%).

Table 12. Known deaths of wolves in southwest Alberta, September 2004 – September 2005.

Wolf Pack	Total known deaths	Deaths – Nov-Apr	Deaths – May-Oct
Willow Creek	0	0	0
Bob Creek	4	2	2
Castle-Carbondale	5	5	0
Waterton/Chief Mountain	0	0	0
Crowsnest	1	0	1
Livingstone/Beehive	0	0	0

With the potential biases discussed above, it is useful to compare the above estimates with another independent measure of mortality. A second calculation of survival based on the ratio of the known population low (27) to the population high (53) produces a **survival** estimate of 51%. The latter value is quite comparable to that determined from radio data (45%). Of note, these survival values are similar to 44% annual survival calculated for the previous year for this population (Old Man Basin Carnivore Advisory Group 2004). These survival rates are considered to be very near the threshold for sustained population survival (Fuller *et al.* 2003). Given that wolves appear to have naturally re-occupied SW Alberta, and given the high human use of the area, we may be managing the mortality optimally, ***if such rates (and population estimates) are stable through time***.

A third method of survival analysis is to use the ratio between the known deaths or dispersal (10 deaths, 0 dispersal – Table 12) and the maximum population estimate (53 wolves – Table 10); this method generates an *annual* mortality rate of 19% (81% annual survival). This estimate does not account for unreported or natural deaths or unknown dispersal, so the true annual rate of mortality is likely somewhat higher. Comparing this result with those values obtained with the first two methods allows an estimate of unreported mortality to be calculated (the difference between two estimates, e.g. 49% mortality – 19% mortality = 30% unknown mortality/dispersal). This value provides useful management context, should detailed radio monitoring cease in this wolf population thus limiting other methods of survival analysis.

It should be strongly noted that the registration of wolf kills is not always complete. Wolf deaths are not always documented in the registrations, some registration forms can be missed by Edmonton data compilers, and other deaths are reported informally to wildlife staff. All of these known deaths are reported here, regardless of registration status.

Similar calculations of annual survival for wolves occupying contiguous habitat outside of large protected areas in Montana produced an estimate of 54% (Smith *et al.* 2006). The population of wolves in Montana is one that recently re-established in the region.

H. Reproduction

A minimum of two pups were confirmed in the Willow Creek pack. No other pups were confirmed in any other pack, though no efforts were made to check den sites. Therefore, additional denning in other packs is not unlikely.

I. General Health

All necropsies done revealed all individuals to be in excellent physical condition with good amounts of body and internal fat. Samples of tissue obtained during nine necropsies were submitted to the Cooperative Wildlife Health Unit at the University of Saskatachewan. Reports indicated that the samples came from a healthy population of wolves. The only parasites identified were minor infections with *Sarcocystis* spp. (muscle worms). Pulmonary ossification (nodules of bone in the lungs) were found in two wolves. This condition is very common in older canids, and is of no special concern. The veterinarian was surprised that he did not detect any sign of *Trichinella* species in any samples.

J. Genetics

Tissue samples were submitted to Conrad Theissen, a graduate student at the University of Alberta studying barriers to dispersal in Alberta wolves. In addition, Mr. Theissen collected additional scat and hair samples during two weeks of snow tracking, confirming the presence of a transboundary pack of wolves west of the Livingstone range (10 wolves), and another two possibly transboundary packs to the south, one on each side of Highway 3. A final report is not yet available, though he has provided the following research update:

A total of 83 wolves (living and dead) from at least 12 packs were identified from unique, 13 locus microsatellite genotypes within the southern portion of the East Kootenays and Canadian Rockies. A combination of scat, hair, blood and tissue were used to derive the genotypes. The wolves were classified by sex using a Y-chromosome marker (females n = 46; males n = 37).

Two packs were found to be crossing between Alberta and BC. Matching genotypes were found for three wolves near Dutch Creek, AB and from near Elk Lakes Provincial

Park in BC, indicating that this pack (North Livingstone) is transboundary between Alberta and BC. While snowtracking this pack they appeared to cross into Alberta from BC at the headwaters of Weary Creek. In the second pack (Crowsnest Pass) a single wolf's genetic material was found during 2 separate tracking sessions, once near Racehorse Creek, AB and once near Alexander Creek in BC. This wolf may have been crossing alone between Alberta and BC or may indicate that the entire pack was crossing.

Interestingly, I believe the scats collected from the cattle depradation investigation (11/08/2002) were from coyotes. The scats contained unique alleles that were only present in the reference coyote samples that I genotyped, and that were never seen in any wolf blood or tissue samples from across the study area. I used the presence of these alleles as criteria for removing samples from my analyses.

I'm working on the subpopulation identification analyses now, so hopefully will have that done soon. It will be interesting to see where those wolves fit in, but early analysis looks like they group together with other wolves stretching up the Columbia Basin.

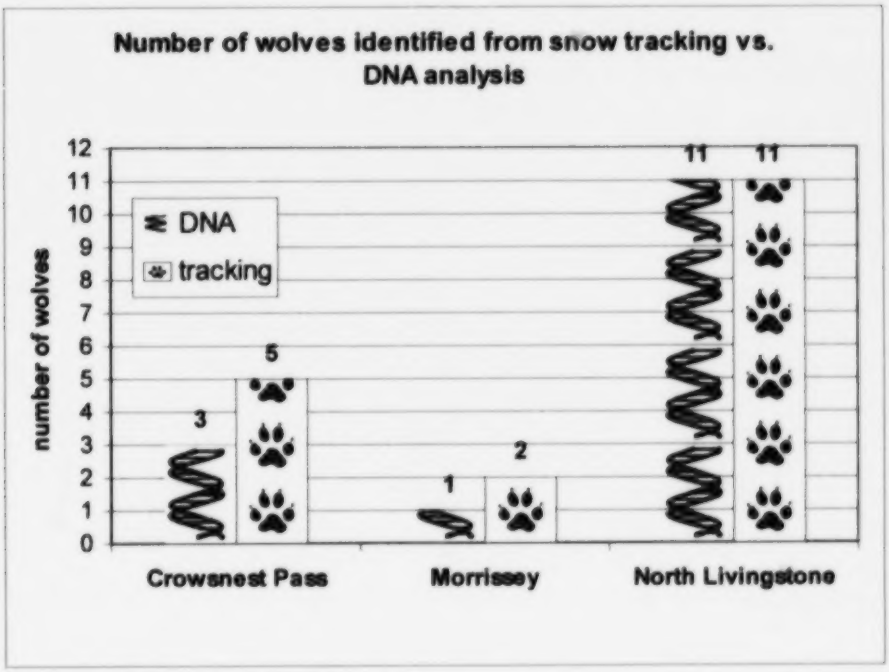

Figure 5. Minimum pack sizes as determined by unique individual identification through genetic analysis (Conrad Thiessen).

K. Habitat mapping

A grizzly bear habitat map for southwest Alberta was created through habitat suitability index (HSI) modelling. Variables in the model include roads, human use features, grizzly bear habitat preference, and habitat context. Full model description is available on our website: **http://www3.gov.ab.ca/srd/fw/speciesatrisk/reports.html (report #90).**

An overlay of wolf home range use, obtained with kernel analysis, demonstrated that this model has high predictive value for wolf use of the landscape (Fig. 6).

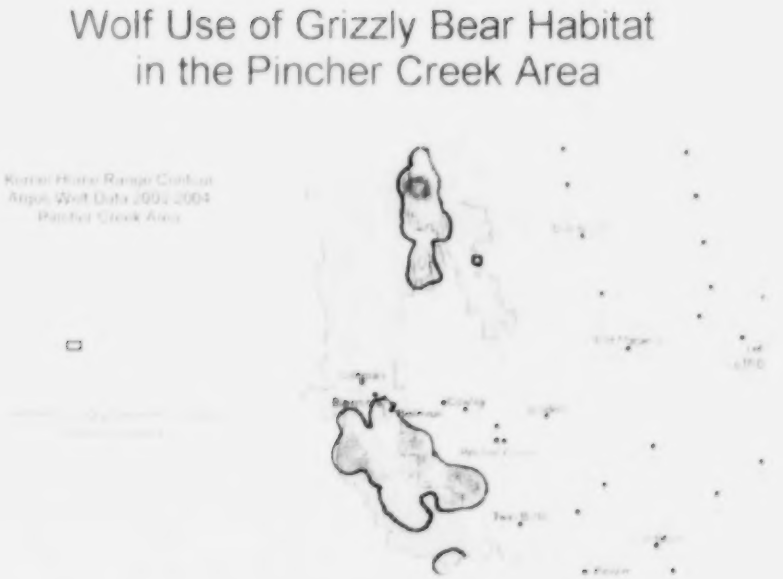

Figure 6. Grizzly bear habitat map with overlay of kernel home ranges of two wolf packs, demonstrating the utility of the habitat model for application to wolf habitat assessment.

L. Adjacent jurisdiction update

Montana: current information on Montana wolf populations and management can be found at http://montana.pranic.fws.gov/wolf/annualreports.htm

BC: Some adjacent and/or overlapping wolf packs were tracked by C. Thiessen (University of Alberta) in the winter of 2004-2005. The most northerly of these packs was tracked also in Alberta.

Kananaskis: C. Mamo (personal communication) confirmed the Highwood wolf pack had 5 pups; 2 wolves were trapped from this pack the preceding winter.

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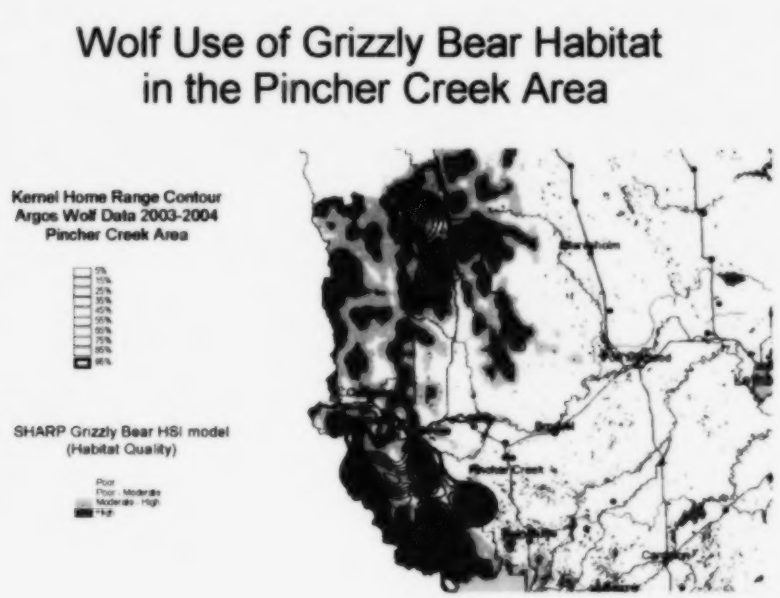
Wolf Use of Grizzly Bear Habitat
in the Pincher Creek Area
Kernel Home Range Contour
Argos Wolf Data 2003-2004
Pincher Creek Area
SHARP Grizzly Bear HSI model
(Habitat Quality)

Figure 6. Grizzly bear habitat map with overlay of kernel home ranges of two wolf packs, demonstrating the utility of the habitat model for application to wolf habitat assessment.

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IV. Conclusions/Considerations

The information contained in this report represents valuable knowledge for those involved in wolf management decisions in Southwest Alberta. Without such information, informed management decisions are impossible. Continued data collection, synthesis and communication are required if these management efforts are to continue. Additional information on an annual basis is especially important at this stage so that we may better understand inter-annual variation in wolf demographics and livestock depredation patterns. These efforts will require sustained monetary support, both internally within Alberta Sustainable Resource Development, and externally from supporting outside agencies and interests.

V. Acknowledgements

Gracious thanks to the individuals participating for their second year in the Advisory Group for their valuable time, knowledge, and patience. Thanks also to many members of the ranching community for their willingness to walk down a new path, especially Bill Cross, Harvey Gardner, Julia Gerwein, Joe Englehart, Chuck Lockton, Dwayne Pole, and Ron Davis. Several local trappers put in effort to help catch wolves in a difficult season. The safe and skilful flying of Clay Wilson and Bighorn Helicopters was much appreciated. Joan Ritzen once again helped immensely with meeting logistics and data organization. Defenders of Wildlife Canada and the Alberta Beef Producers contributed funds and encouragement. The department of Community Development assisted on numerous fronts, including funding, accommodation and field work.

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Personal Communications

Charles Mamo, SACC biologist, Cremona Alberta. Personal communication, 1 November 2004.

Appendix 1. Budget details for 2004-2005 wolf management.

Expense	Amount	Year	Type of expense	Contributor
Capture/euthanziation of alpha male in BC pack (2.2 hr)	$2,471.00	2004-2005	heli time	SRD - WMB
Monitoring flight for CC and BC packs (2.7 hrs)	$2,654.10	2004-2005	heli time	SRD - WMB
Wolf capture (1 in CC pack) (2.1 hr)	$2,079.50	2004-2005	heli time	SRD - WMB
Wolf capture (1 in WC pack; #79) (2.1 hr)	$2,307.10	2004-2005	heli time	SRD - WMB
Advisory Group expenses	$2,835.00	2004-2005	CAG	SRD - WMB
Satellite collars (3 @ $1866) Lotek beta agreement	$5,598.00	2004-2005	collars	ABP/CD
Data acquisition	$2,167.48	2004-2005	trap/monitor	SRD - WMB
Contract for sign surveys (Livingstone)	$6,000.00	2004-2005	trap/monitor	DWC
Monitoring flight for 3 packs (fixed wing, 2.3 hours from Calgary)	$1,024.67	2004-2005	fixed wing	SRD - WMB
Capture and collaring (15 Jan 05; 5.7 hr; 5 wolves caught)	$5,958.50	2004-2005	heli time	SRD - WMB
Capture and collaring (7 Mar 05; 2 hr estimated; no wolves caught)	$2,255.00	2004-2005	heli time	SRD - WMB
Trapper contract (McIntosh, Hoffman)	$175.00	2004-2005	trap/monitor	SRD - WMB
4 GPS collars (Blue Sky) @ $3066	$12,264.00	2004-2005	trap/monitor	SRD - WMB
Capture and collaring (30 Mar 05; 2.6 hr estimated; no wolves caught)	$3,344.00	2004-2005	trap/monitor	SRD - WMB
TOTAL	**$51,133.35**	2004-2005		

Appendix 2. The Economics and Effectiveness of Nightriding as a Preventative Measure to Wolf Depredation: an experiment

1.0 Introduction and Background

From Argos telemetry data gathered on 3 wolf packs in Southwest Alberta in 2004-2005, and as seen in other areas, wolf activity and movements appear to happen primarily at night. Although the exact timing of the cattle depredations is not known, it would appear that such activity also happens primarily between dusk and dawn. The Bob Creek area has been a hotspot of wolf depredation since wolves re-colonized southwest Alberta over the past two decades.

Three wolves in the Bob Creek pack were collared in February 2004. Movements were subsequently monitored, and no livestock depredations by this pack were recorded in the winter months. The third week in March, the pack moved eastwards into the Porcupine Hills, and was implicated in the death of two cattle owned by two different producers. On 1 April 2004, approximately 1250 yearling cattle were moved into a grazing allotment in the center of the known wolf territory, as part of a dormant season grazing experiment by SRD – Rangelands Management Branch.

Through the first three weeks in April 2004, 7 of these cattle were killed or severely injured by the Bob Creek pack, and an additional yearling on the eastern fringe of the territory was also critically injured. These cattle were monitored and checked during daylight hours for all but a few days of their tenure on the allotment. Telemetry gear was given to the rider to help in determining the presence of the wolves.

On at least six evenings prior to sunset, an additional check was conducted by the rider, and shots fired in the assumed vicinity of the wolves. In at least two of these cases, the wolves appeared to have moved northwards, following the shooting, and remained there for 1-3 days before returning to the vicinity of the cattle in the grazing allotment.

In response to the continued depredation, the alpha male wolf (collared 20 March) was removed from the pack by agency staff on 19 April 2004. The group of 1250 yearlings was scheduled to be moved out of the allotment where the depredation occurred, to nearby leased land on 24 April 2004.

Following the removal of the single wolf, it was decided to implement a nightriding experiment. As part of the design of the exercise, a control period (i.e. no nightrider) was implemented. The experimental period would not begin until further depredations occurred, to control for the removal of the alpha male wolf. No further depredation occurred at this time, so the experiment remained incomplete.

In spring 2005, the SRD Rangeland Management Branch, with the participation of Bob Creek Ranch, continued an experiment to document seasonal habitat selection of cattle. The SRD Fish and Wildlife Division expressed concerns about risk of wolf depredation in this area of public land during the spring months, based on 4 wolf kills and one injury

of cattle in the preceding month in other portions of the Bob Creek wolf territory. A compromise was made, and the "nightrider" experiment designed in the previous year was carried out. This report documents the experiment.

2.0 Objectives

- To test whether human presence combined with the ability to detect wolf presence through radio telemetry is effective in deterring or decreasing depredation rates of cattle, during hours of darkness (can a "nightrider" be effective?).

- To examine the economics of "nightriding" as one of a suite of proactive measures intended to minimize wolf-cattle conflict.

3.0 Methods

The methods outlined below were originally described for the 2004 experiment. Changes for the current 2005 experiment are documented in bold type.

- To minimize the confounding influences of cattle being removed to a nearby pasture, as well as the removal of the alpha male wolf, a control period will occur during which depredation will be monitored (for comparison of depredation rates before and after presence of a nightrider). If no further depredation occurs in the control period, then the experiment will be postponed to a future time, as no comparisons can be made. **(A decision was made not to implement a control period in the 2005 experiment, as losses were not considered tolerable at that time).**

- The control period will last 3 weeks, or will be terminated sooner if three confirmed depredations by the Bob Creek pack (in the herd present on the allotment) occur.

- The experimental period will last a similar duration as the control period, or three weeks, whichever is longer. The experimental period will be terminated sooner if three depredations occur after it begins. **(The experimental period lasted the duration of the allotment spring grazing period in the 2005 experiment).**

- During the experimental period one individual will be employed to camp in the vicinity of the cattle at risk of depredation. Hourly telemetry checks will be conducted between the hours of 8pm and 8am. Should the wolves be detected in the area, shots will be fired in the direction of the wolves (without intent to injure), and harassment continued until it is determined that the wolves have moved away. **(In some cases multiple individuals were present, and the frequency of monitoring was somewhat dependent on weather and known wolf locations.)**

- Day monitoring of cattle will continue as in the control period (with records kept of timing and frequency of checks – to be correlated with any known depredation and wolf activity).

- Compensation for cattle lost to confirmed depredation by the Bob Creek wolf pack during the control and experimental periods will be increased to fall market value, to be determined when the remaining cattle are sold to market, with an average value being applied to each individual lost. Budget: to a maximum of 6 cattle, with partial compensation through the existing program, and additional compensation to level defined above paid out of wolf management budget.

4.0 Results

Approximately 1200 cattle under one year of age were grazed in the Bob Creek allotment (Beaverdam Distribution unit) from 31 March – 19 April 2005 (19 nights) for purposes of grazing experiment examining seasonal habitat selection. The pasture was approximately 1090 ha in size (2 miles by 1 mile), and was characterized by rugged north-south ridges and montane habitat comprised of Douglas fir – spruce – pine forest and interspersed with fescue grasslands. (M. Alexander, SRD Rangeland Management Branch, pers. comm.).

Following the protocol outlined above, notes follow from ten individuals involved in the experiment. The number of people out each night was generally only one, but up to 4 were present on one occasion. Monitoring was either continuous, or half hourly. In some instances when wolves were believed not to be in the area, monitoring was reduced to every 2 hours. When wolves were determined to be near through interpretation of radio telemetry signals, observers positioned themselves on the side of the pasture near the approach, and deployed bangers and screamers (pyrotechnic scare devices) from handheld pistols and/or shotguns, with the intent of chasing the wolves away from the area. Three of five wolves carried VHF radio collars to allow detection of wolf approach to the pasture. The pasture at risk was located entirely within the known territory of the Bob Creek wolf pack.

Notes from those who participated are detailed below.

31 March 2005 – 1 April 2005 *(monitoring by Carita Bergman and Noah Bergman)*

Set up camp 699815E/5533324N in afternoon. Monitored half hourly from dusk to 11pm, then every 2 hours until 4am, and half hourly thereafter until 9am. No signals detected. Argos locations showed wolves in north territory near den site. Moved camp to 698380E/ 5533664N and finish at 11 am. Partly cloudy with 100 km/hr+ winds!

1 April 2005 – 2 April 2005 *(monitoring by Carita and Noah Bergman)*

Monitored half hourly through the night. No signals detected (wolves still north by den). Took down camp and out by 9am.

2 Apr – 3 Apr (monitoring by Mike Alexander and 3 others)

Camped in same site as previous night, monitoring half hourly through the night; wolf signals detected twice: weak to north around midnight, and strong to NW around 4 am, with bangers fired on second occasion and signals disappearing after 10 min.

3 Apr – 4 Apr (monitoring by Dwayne Pole)

He did not have any telemetry equipment but went out for the night and fired off his gun at random intervals.

4Apr - ?? (7 Apr??) (monitoring by Charles Mamo)

April 4

Spoke with C.B. and got an update on the packs latest location north of the Chimney rock rd. Went to Bobs ck and spoke with Dwayne and his wife Carla. They have not had any reason to suspect that the wolves have been around since the cattle are well distributed and undisturbed. I took my three- wheeler into the pasture and set up camp at the base of the middle ridge. I walked to the top of the ridge above camp in the centre of the beaver dam pasture and scanned for the wolves. I spent the night walking the main trails and middle ridge checking for signals. No signals were heard and the cattle were undisturbed.

Went back to Chain lake in the early AM then searched for the wolves from the Bobs ck and willow ck pack. Nothing heard.

April 5

Went back to Bobs ck at 1530 and hiked to the top of the middle ridge and stayed up top until midnight then went down and took the trike to the south end of the pasture. I stayed at the south side until approx 0200 April 6 then returned to the middle ridge. At 0630 I picked up a weak signal from the Bobs ck pack to the west of the pasture. At 0650 I was able to get a good location on all three radio collared wolves at UTM 980 297, which is above the ranch buildings and to the east. At 0700 I fired off two cracker shells and a screamer. Within 5 min I could not pick up a signal from the wolves as they had gone over the ridge to the east. I went around the ridge and was able to pick up their signal as they crossed the valley at approx UTM 005 304. The wolves moved quickly to the base of the east ridge. At 0700 I fired off another cracker shell. I attempted to follow the wolves to the top of the ridge and then walked along the fence to the north. The wolves appear to have moved further north as I could not get any signal.

April 6

Left the Bobs ck area and went to the Willow ck pack territory to search for them. No luck. Met up with Gudrun at Chain Lk at 1600 then went back to Bobs ck. Set up her camp then searched for the wolves.
2315 Gudrun picked up signal from Bobs ck pack on the top of the east ridge. Fired banger and blew the air horn.
0030 signal again from Bc6 same direction. Fired screamer and bangers at 0210 at 0222 and 0226: the signal disappeared.
0320 signal to the S.E. of camp - not strong.
0500 weak signal from the S.S.E. of the camp area.
0530 to 0730 a weak signal from Bc6 to the S.E.

April 7
Continued searching for the Bobs ck pack but did not get any more signals. The cattle seem undisturbed by the night's activity. I met with Dwayne and gave him an update. Then packed up camp and went back to Chain Lk. Went into Willow ck to search for the collared wolves: no luck. Talked with J. Englehart and he reported seeing wolf tracks on Sheppard ck. He has not heard from anyone regarding any problems with wolves.

April 8
Checked for the Bobs ck pack on the Chimney rock rd but did not hear any signal. Stopped at Lyle Thomson's, but there was no one around. Went through the Highwood and checked the old den sites for recent activity. There was fresh wolf tracks and scats in the vicinity of the furthest West den so I did not proceed any closer. I spoke with J. Bosgra and he told me that he sold his trap line to Jim Simpson. Learned that Simpson killed two wolves this winter in the Fitzsimmons ck area [Feb 05 and 21].
Back to Cremona.
(April 8th cont from Gudrun's notes).
Check along trail to the ranch 1730 until 2030 and from camp until 2215.
From 2240 to 0330 at camp: no signal.
From 0400-0500 walked to the South then back to camp 0600-0730: no signal.
Continued to check for wolves throughout the day.

April 9
Scan from camp until 2330 then to the top of the middle ridge.
0010 picked up a signal from Bc 6 to the N.N.E.
Drove the trike to the North fence but could not get a signal. Fired a screamer and blew the horn at 0100.
Drove to the SW fence and fired banger and the horn.
Back to camp and up the hill: 0330 -0515 did a full circle on the ridge 0600-0900: no signal.

April 10
Scanned 1530 -1730 then to the north fence 2100-2145: no signal.
Up hill at 2220-0400 back to camp 0445 -0545.

Up hill at 0904 weak but clear signal from Bc6 straight to the North. Walked down slope then no more signal.
(April 10 cont C. Mamo notes)
To Chain Lk. Met with Gudrun and exchanged equipment.
Continued to Bobs ck and met with Dwayne for an update. He seems happy with the process so far.
Set up camp and started to scan for the wolves. Spent the night going from the North fence to the South with two trips to the top of the ridge but no signal.

April 11
Continued to search for the wolves but did not have any luck. No signal during the night: did not get any signals until 0633. Signal from Bc6 to the North. I was unable to get a good location and the signal was far enough that firing the banger was not warranted.

April 12
0700-0820 picked up a signal from Bc6 to the North 5-6km on the west side of Bobs ck. I was unable to pinpoint the location .I attempted to get closer by heading up the creek but eventually lost the signal. I could not pick up the other wolves from the ground. Had a message relayed that a wolf had been shot at the D ranch. Met with F&W in Highriver a learned that the message was in error and that a calf of Bews had been killed. R Gluckie had confirmed that the kill as caused by wolves. P Bews had seen one wolf with a radio collar. Attempted to get in touch with Peter but could not .I went back to Bobs ck for the night. Nothing heard until after 1200.

April 13
0110 picked up a signal from Bc6 to the North of the pasture. Tried to get closer in order to get a more accurate location. The best location was about 1km to the NE of the N fence.
0135 fired off 2 bangers and one screamer. The signal from all three wolves diminished and disappeared in less than 15 minutes.
Continued to check but did not hear any more from the wolves that night.
Drove north and picked up a signal from the Bc pack in the area of the Saddle Mtn road. Continued North to search for the Willow ck pack: no signal heard. Stopped at both Bews' and at G Cartwright's but there was no one around at either place. I went
back to the pasture by 1730. There was nothing heard from the wolves all night.

April 14
Snow started falling at 0300 and it became very cold: an accumulation of about 15 cm. Continued the search all night but did not hear anything from the wolves. Spoke with Dwayne in the morning and he informed me that they will be moving the cows one field to the South on the 19th. Spoke with T Mack to confirm the cattle depredation on the Bews' calf. I picked up a signal from Bc6 to the West of Chain Lake in the dirty water lake area. Searched for the Willow ck pack up

through the Indian graves area but did not find them. Went to the D ranch but no signal. Back to Bobs ck. Checked for the Bobs ck pack until 2400.

April 15
0300 picked up a weak signal from Bc1 but could not get a signal from any of the others. The signal became stronger until 0600 when I was able to get an approximate location UTM 995 347.
0615 fired off a banger and again at 0635 then the signal diminished and disappeared within 10 minutes of the last banger. I hiked North of the pasture but did not pick up a signal again.
I packed up camp later in the day and then went to meet with Dwayne. He felt good about the experiment and thought we had better than expected success.
I met with Judy and Einer Nelson who live just South of the Bobs ck ranch. Have not had any wolf problems recently although Einer shot one a few years ago. They seem to want to get along. They sell natural beef and are attempting to direct market.
Met with Joe and his hired help who were out fencing. They had seen fresh grizzly bear tracks but no fresh wolf. Joe was asking about the telemetry gear.
Spoke with Mac Main about wolf issues and he indicated that he didn't have any this year but may have lost some calves last year. He has seen 9 wolves in the pack and thinks that they are mostly grey. Neighbours have lost cattle and he mentioned KC Shenton.

6 Apr – 11 Apr (monitoring by Gudrun Pflueger)

NIGHT WEDNESDAY/THURSDAY (6TH-7TH APRIL):
GET SIGNAL OF BC6 AT 00:20 AT THE SAME SPOT AS THE SAT LOCATION FROM
WEDNESDAY 15:00PM; AROUND 1:00 FIRE BANGER, HOWLER AND BLOW HORN AT THE FOOT OF THE SLOPE; WOLVES DISAPPEAR, PROBABLY OVER THE WHALEBACK RIDGE (WBR)TW.
EAST BUT COME BACK AROUND 2:30AM A BIT FURTHER SOUTH ON THE WBR; ...HAVE TO LOOK UP NEXT DETAILS IN MY NOTES; ALL I KNOW RIGHT NOW IS, THAT BTW. 4:00 AND 5:00 IT WAS SILENT; AT 5:00 I LOCATED BC 6'S SIGNAL SOMEWHERE IN THE EASTSIDE OF A RIDGE ON THE SE SIDE OF THE PASTURE; WHEN THE SIGNAL DISSAPEARED AND I RECEIVED IT AGAIN AROUND 6:00 FROM THE SW, POINTING SOMEWHERE TOWARDS SW OF THE RANCH BUILDINGS. WHICH IS VERY WREIRD, SINCE AROUND THAT TIME I GUESS, THE SAT LOCATION PUT HIM E OF HW 22??? (AS YOU ALSO DESCRIBE ABOVE)

THURSDAY/FRIDAY (7-8 Apr):
AGAIN: FISRT SIGNAL AT 00:10 FROM SAME SPOT AT NW CORNER OF PASTURE IN WBR SLOPE;
SINCE I AGAIN RECEIVED THE SIGNAL WHILE BEING ON TOP OF THE HILL BEHIND THE CAMP, I WENT DOWN AND TOWARDS THE SIGNAL; HOWVERE,

I NEVER COULD PICK UP THE SIGNAL AGAIN FOR THE REST OF THE NIGHT. I DROVE TO THE N FENCE OF THE PASTURE AND FIRED OFF SOME CRACKER AND HOWLER AND HORN TO GIVE THEM THE WHOLE SHOW IN CASE THEY WERE SOMEHWHERE. PLUS THE SAME REPRETOIRE ON THE SIDE ABOUT HALF AN HOUR LATER

FRIDAY/SAT (8-9 Apr);
NO SIGNAL THE WHOLE NIGHT

SAT/SUN (9-10 Apr):
NO SIGNAL

SUN/MON (10-11 Apr):
NO SIGNAL THE WHOLE NIGHT, BUT RECEIVED BC 6'S SIGNAL AT AROUND 7:15AM FROM THE HILL-POINTING PRETTY STRAIGHT N; I CAN IMAGINE, THAT I COULD PICK UP THE SIGNAL FROM THE LOCATION YOU DESCRIBED TURNED DUTY AND BANGER...OVER TO CHARLES ON MONDAY MID DAY.

11 Apr – 14 Apr (monitoring by Charles Mamo)

14 Apr – 16 Apr (no monitoring)

16 Apr – 19 Apr (monitoring by Joann Skilnick)

I just wanted to let you know what happened, what I did while I was monitoring the wolves.

I went on Saturday night (April 16-17). That night I set up camp where Charles had his tent set up. Then about 7:00 I hiked up to the top of the ridge. Looking at a map, my UTM co-ordinates would have been about 698488e and 5533089n. Part-way up I shot off a screamer (about 7:30?) to practise as you had in your notes. When I got up, I started listening for the signals every half hour and didn't get anything. By about 1:30, I gave up and went back to the tent.

The following evening (Apr 17-18). I set up my tent on the top of the ridge. I first listened for the wolves about 8:30 and picked all three up at that time. However the signal seemed to be coming from beyone (North) of the fenceline and I decided I would let them stay there. I thought if they were hunting in an area without cows (which is appropriate behaviour), it would not be good to chase them from there.

At about 3:30, then signal seemed to have moved closer to more west of where I was. I walked west along the fenceline to the next ridge over. I'm guessing my position was about 697865e 5533025 west. I got stuck on a point where I really couldn't figure how to go any further. The signals seemed to be coming from a really large valley. Part-way to the point, I shot off one banger. At the point and about an hour later, after they didn't seem to move away, I shot off another three in a row (hoping to simulate heavier gun

fire). About 5 minutes later I heard wolf howling. I'm not entirely sure where it was from - but perhaps in the bottom of the valley or the opposite slope? I'm also not sure that they were in the beaverdam pasture. But it sure felt like they knew that they were dealing with an amateur and were laughing at me. Regardless, half an hour later the signals were fainter and by 6:00, I could not hear the signals at all.

Then the following night (Monday, Apr 18-19) I set up camp in a different spot and hiked up a different ridge. I was hoping to be closer to the area I thought they were the previous evening. I think at the top I was at a UTM 697957e and 5532775n. Beginning at about 8:00, I could hear a faint signal from 149.0140. But it seemed quite far away and I assumed it was outside the pasture. I could not hear the other two collars. By 11:30 the signal was even fainter (I could barely hear it). I had been doing some seranading to the moon (show tunes mostly) so I'm pretty sure that's what scared them off. Both Meeka and I were pretty wet and cold from the snow that day so we gave up by 12:00 and huddled in the tent till morning. I'm hoping they didn't trick me after that and sneak back in during the early morning. I guess your points will tell me what happened.

Argos Locations during the Experimental Period

The following information documents the location of BC2, an adult female in the Bob Creek pack carrying an Argos satellite collar (first captured in early 2004), during the duration of the experiment.

Thu 31 Mar 11:30 pm: 6 km SW of Chain Lakes

Fri 1 Apr 11 pm: 5 km SW of Chain Lakes

Sat 2 Apr 4pm: 4km SE of Chain Lakes

Sun 3 Apr 6am: 5 km SE of Chain Lakes

Mon 4 Apr 6 am: Chimney Rock Road

Tues 5 Apr 11 pm: White Creek area

Wed 6 Apr 6 am: west side of cow pasture (night wolves chased off pasture from multiple directions)

Thu 7 Apr 6-7am: 6 km SE of cow pasture in area of high elk density

Fri 8 Apr 6 am: at den site in north end of territory (23 km north of cow pasture)

Sat 9 Apr 12am: """

Sat 9 Apr 6 am: 16 km north of cow pasture near Mowat's ranch

Sun 10 Apr 12 am: 11 km north of pasture SW of Davis ranch

Mon 11 Apr 4 pm :10 km north of pasture in White Creek area

Tue 12 Apr 6am: 7 km north of pasture

Wed 13 Apr 6am: Saddle mtn road 15 km north of pasture

Thu 14 Apr 12 am: Chain Lakes area

Fri 15 Apr 6 am: Chain Lakes area

Sat 16 Apr 6 am: Chain Lakes area

Sun 17 Apr 4:30 pm: 5 km north of pasture

Mon 18 Apr 12am: 1 km northwest of pasture

Mon 18 Apr late aft – 21 Apr: 5-7 km northwest of pasture

Signals of collared wolves were detected on (5 +Charles) nights near/in pasture. Aversive action (noise, chasing, bangers, screamers, air horn) was taken on (4 +Charles) nights. One of the first attempts by the pack to enter the area was repeated and persistent: Charles caught them attempting to come in through 3 different directions over the course of the night (details forthcoming!). No cattle were known to be killed during this period, either in pasture or elsewhere; cattle were well dispersed through entire pasture, and did not bunch up, as may happen when wolves are present and harassing cattle (Dwayne Pole, Bob Creek Ranch manager, pers. comm.). Cattle were moved to an adjacent pasture at conclusion of experiment.

6.0 Calculation of Cost

Item	Amount	Real Cost	Incurred Cost	In-kind Contributions
Labour	23 person-nights @ 15 hours/night = 345 hours @ $20/hr	$6900.00	$5000 ?? (Defenders of Wildlife Canada)	SRD Joann Skilnick Gudrun Pflueger
Supplies (cracker shells,	75 cracker shells @ $0.75/each; 75	$932	$60	SRD

primers, pistols, shotguns)	primers @ 0.05/each; 2 shotguns @ $400/each; 2 hand pistols @ $36/each			
Gasoline	40l/day @ $0.86/l x 19 days	$646		SRD Dwayne Pole/Bob Creek Ranch
Food	$40/day * 23 person-nights	$920		SRD Dwayne Pole/Bob Creek Ranch Joann Skilnick
Quad	$50/day x 19 days	$950		SRD Dwayne Pole/Bob Creek Ranch
Truck	$100/day x 19 days	$1800		SRD
Camping equipment	$25/day x 19 days	$475		Carita Bergman Joann Skilnick Mike Alexander
TOTAL		$12623.00	$5060.00	
Total daily cost/head of cattle	$12623/1200 cows/19 days	$0.55/ animal/day	$0.22/ animal/day	

7.0 Discussion

It is important to note the conditions that may have contributed to the success of this experiment. Without these conditions, success in preventing depredation could be expected to vary. First, the presence of VHF collars on the resident wolf pack is a prerequisite to the experiment. Second, the area, although very rough in topography, was relatively small. It is doubtful whether such a technique would be effective on a much larger cattle range, as the observers would have trouble locating some approaches of wolves, and moving to a suitable area to deploy negative conditioning tactics. Third, dedicated staff and sufficient resources (both in-kind and monetary) must be identified for the entire period.

The presence of a nightrider, under the conditions described here, appears to be highly effective in preventing wolf depredation on cattle. However, the cost of implementing this technique is likely too large a burden for the average ranch, and future use of the technique would require outside funding sources.

8.0 Postscript

During the first week of May 2005, in a pasture adjacent to the allotment where cattle had been moved at the conclusion of the experiment, the remains of three steers confirmed by Fish and Wildlife Officers to have been killed by wolves, were found. In effect, this incident serves as the missing "control" in the experiment, illustrating that nightriding was indeed an effective deterrent to depredation under the conditions it was conducted.

9.0 Acknowledgments

Large thanks to Bill Cross, Julia Gerwein and Dwayne Pole for their willingness to test a new approach and participate in the experiment. Thanks also to those listed here who participated in the experiment, many of whom were conscripted at the last moment when unexpected events necessitated a change in plan.